Detailed response to TRAI Consultation Paper (No. 3/2009) on "Licensing Issues relating to Next Generation Networks"
by
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A. Introduction

It would be useful to quote in ITU-T's definition of NGN, *in toto,* to set the overall context for our responses to the specific issues raised in the consultation, even though the Authority has indeed referred to it in Section 3.3, albeit partially. ITU'T's definition of NGN available at http://www.itu.int/ITU-T/ngn/definition.html follows:

> *"A Next Generation Networks (NGN) is a packet-based network able to provide Telecommunication Services to users and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent of the underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and services of their choice. It supports generalised mobility which will allow consistent and ubiquitous provision of services to users. [ITU-T Recommendation Y.2001 (12/2004) - General overview of NGN]*
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> *The NGN is characterised by the following fundamental aspects:*
>
> - *Packet-based transfer*
> - *Separation of control functions among bearer capabilities, call/session, and application/service*
> - *Decoupling of service provision from transport, and provision of open interfaces*
> - *Support for a wide range of services, applications and mechanisms based on service building blocks (including real time/streaming/non-real time services and multi-media)*
> - *Broadband capabilities with end-to-end QoS and transparency*
> - *Interworking with legacy networks via open interfaces*
> - *Generalised mobility*
> - *Unfettered access by users to different service providers*
> - *A variety of identification schemes which can be resolved to IP addresses for the purposes of routing in IP networks*
> - *Unified service characteristics for the same service as perceived by the user*
> - *Converged services between Fixed and Mobile networks*
> - *Independence of service-related functions from underlying transport technologies*
> - *Support of multiple last mile technologies*
> - *Compliant with all Regulatory requirements, for example concerning emergency communications and security/privacy, etc. "*

We appreciate the endeavors taken by the Authority in developing a roadmap for NGN migration within India and the ensuing consultation paper is an important step in that direction.

However, we humbly submit that since interconnection and Quality of Service (QoS) are intrinsically linked to the licensing framework as also bears out from the ITU-T definition cited hereinabove, it is desirable that the Authority makes a single set of holistic recommendations is made by the Authority encompassing licensing, interconnection & QoS even if the different consultations are undertaken on each of these three broad themes starting with the instant one on licensing issues.

B. Beneficial Impact of NGN on the Environment

Benefits of NGN go beyond just simplification of the network architecture and to act as the platform for unleashing innovation. According to ITU-T Technology Watch Report 7 **"NGNs and Energy Efficiency"** available at **http://www.itu.int/dms_pub/itu-t/oth/23/01/T23010000070002PDFE.pdf** , NGNs consume overall lesser energy than the conventional system of multiple networks. In fact, the reports mentions that efficient planning and accelerated migration to NGN across the world has potential to cust down overall carbon footprint by 15% (almost five times that of the ICT sector's projected carbon footprint in 2020) even as the carbon footprint of the ICT sector itself is likely to triple between 2002 and 2020.

This is too important an opportunity to miss. Such efficiency would be achieved by dematerializing, viz. replacing movement of material (atoms) by movement of data (bits) within the global ICT infrastructure.

C. Clarification of the term "Service Provider"

In the consultation paper, the term "Service Provider" has been used throughout the document in multiple contexts, when referring to either the NGN Network Operator (who provides network transport) or NGN Service Provider (who supplies applications and services, including contents) which are two significantly different roles in the context of NGN, even though they can at times be performed by the same entity. Hence, it would be useful for the Authority to use more specific terms such as NGN Network Operators (NGN NetOps) and NGN Service Providers (NGNSPs) for these respective functions. It is important to distinguish these two roles and their respective obligations such that when an entity assumes both roles, that entity does not discriminate against "off-deck" services offered by other NGN Service Providers. It is important that NGN networks remain open for service competition and innovation by all market participants, while also allowing tiered and differentiated services when different SLAs are explicitly defined and agreed upon amongst the network operators, service providers, and end-users.

D. Global Outlook

Considering that NGN is actually going to be a global network even though licensing frameworks may be administered by the respective national licensors, it is extremely important that India aligns itself with global frameworks in terms of policies, regulations & standards, etc. through proactive participation in relevant forums.

E. Changes in the Wider Legislative & Regulatory Framework

With the notification of the Information Technology (Amendment) Act 2008 on 5th February 2008, the principal Act (Information Technology Act 2000) has undergone significant changes. These include but are not limited to, provisions related to criminalization of certain activities, liabilities of third parties/intermediaries in the, data protection & privacy, retention of evidence, critical infrastructure protection, encryption & blocking of content, etc. In terms of certain specific provisions, the government may prescribe rules and/or prescribe relevant guidelines.

As all the stakeholders covered within the ambit of NGN (network operators, application/content providers and even the subscribers) are covered within the various provisions of the Information Technology Act, it would be useful for the Authority to peruse through the relevant sections & provisions accordingly and factor in their implications in the NGN environment.

F. Consistency & Collaboration with other Regulatory & Statutory Authorities

There are several other authorities including but not limited to the following that may be dealing with one or more aspects related to NGN:

- Controller of Certifying Authorities (CCA)
- Computer Emergency Response Team – India (CERT-IN)
- Reserve Bank of India (RBI)

Hence, it would be desirable to ensure a priori consistency across the respective rules & regulations by different authorities so that the network operators, the service providers and last but not the least, the end users are not left with ambiguity. Any mechanism to facilitate this process would be of huge benefit to one & all.

G. Response to Specific Issues Raised in the Consultation Paper

5.1.1 In view of emergence of NGN and technological innovation, do you perceive the need for change in present licensing and regulatory framework? If so, elaborate the changes required in existing licensing and regulatory framework? Give your suggestion with justifications. (refer para 4.10.16)

We support, in principle, the Authority's recommendations for **"Unified Licensing Regime"** (ULR) as NGN drives convergence in the network infrastructure as well as in the service framework. This would support the realization of the core mission of NGN, viz. **"One Network, Multiple Services"**.

Compared with narrowly-defined, service-specific separate licensing framework, ULR would provide a more harmonized, predictable and yet flexible regulatory environment motivating all stakeholders to invest in the infrastructure as well as in innovative services.

This would inevitably assure better return on investments, thus encouraging and accelerating migration towards NGN, and by definition, aid in the broadband development & deployment.

All the same, it would be desirable if the Authority revisits the various norms recommended earlier for ULR to factor in the current market conditions and the several other significant changes that have already occurred in the licensing framework since it made its orginal recommendations on ULR.

5.1.2 Is there a need to identify the control points and monitor the market development to ensure smooth migration to NGN? In your opinion what should be the regulator's role in such context? Please give your suggestions with justification.(refer para 4.11.9)

There is no certainty in terms of predicting what and whether or not any "control points' will emerge in an NGN scenario, as brought out in the consultation paper. Hence, it would be rather presumptuous for the Authority to define *ex ante* regulation over artificially-defined "control points" in the NGN network.

The concern over anti-competitive market dominance should be dealt with at a higher level (e.g., via functional or structural separation measures, if necessary) rather than at component-level of an NGN network.

As the NGN network architecture will continue to evolve as technology and market advances, a "control point" identified today may morph into a different role or even disappear, making the regulation based on such basis quickly obsolete. We support the observation that the Authority has made that *"regulators across the world are looking to move away from detailed ex-ante regulation to light-touch that focuses on the main principles and leaves specific compliance to ex-post activities and general law relevant to the sector."* (para 4.11.7)

5.1.3
(i) In an NGN environment where the content provider and the carrier (Telecom Service provider) could be either same (On deck) or two different entities (Off deck), who should be responsible for ensuring content regulations? Should content provider (In off deck scenario) be made fully responsible for infringement of intellectual property right violation of advertisement code, program code or any other provisions as existing, in respect to his content? How such provision can be effectively implemented? Give your suggestions with justification.

In principle, we support the approach that (off-deck) content providers be responsible for compliance to content regulation and IPR laws, etc. However, we would like to add that the Authority should peruse through the amended Information Technology Act as well.

(ii) In case of off deck content provision, Should responsibility of telecom service provider be limited to prevent the flow of content notified as violation of various provision of IPR, program code, advertisement code etc to encourage flow of more content on the network? Give your suggestion with justification. (refer para 4.12.7)

Consistent with our response to 5.1.3(i) hereinabove, we support the view that responsibility of NGNNetOps be limited to preventing the flow of content legally notified as in violation, provided that the source of the flow is clearly identifiable and addressable. In order to strike an effective balance between consumer protection on the one hand, and a flourishing online business on the other one, it is vital that any regulation or legislation places regulatory responsibility on the entity which has effective control of the content.

This is true whether the content provider is integrated (on deck) or is separate from (off deck) the entity providing the distribution and transport. Such responsibility could be met through industry self-regulation, codes of conduct, and the like. There are significant and important limits as to the extent to which Internet service providers, search engines, and platforms for user generated content that are conduits, and do not use editorial control to set a program schedule, should be seen to have (or should be tasked with) any such control or with liability for content posted by users or collected via the Internet.

5.1.4 In order to support subscribers' end-to-end SLA requirements across the networks, is there a need to well define different types of SLA at point of interconnect (POI) among operators in NGN environment? What parameters must be considered for defining such SLA? Please give your suggestions with justifications. (refer para 4.13.3)

We concur with the importance of supporting end-to-end subscriber SLA across NGN networks, and this should be equally applicable to both "on-deck" and "off-deck" services. We also support the need for a degree of regulatory enforcement (and encouragement) on network interconnectivity and SLA fulfillment, for the ultimate benefit of end-users.
On the other hand, such regulatory enforcement should not restrict NGN network operators from offering tiered services with varying bandwidths and different quality of service levels, as long as there is full transparency and information to consumers about the type of content, services and applications that are accessible, including information about how legitimate traffic management policies can impact the delivery of such services.

5.1.5
(i) Do you agree that there is a need to define common point of interconnection to facilitate interconnection in NGN environment both technically and economically? Give your suggestions with justifications.

We agree that common points of interconnection (PoIs) are instrumental in facilitating interconnection in NGN environment, just like they were in the traditional ISP networks.

(ii) Do you agree that interconnection of all service providers/entities through Interconnect exchange will be desirable to facilitate peering of IP traffic in NGN environment? If yes, should all service providers be mandated to get connected (at least with least defined capacity) to Interconnect exchange? Please give your comments with justifications. (refer para 4.14.11)

We agree that Interconnect Exchanges are desirable to facilitate peering of IP traffic in NGN environment, and are complementary to private peering arrangements. We support, in the interests of end-users, a regulatory mandate that all network operators provision connection to the Interconnect Exchange with a minimal quality of service requirement. This would ensure network connectivity and service availability, from an end-user perspective, regardless of the size of the network to which the end-users are directly attached to. Again, as mentioned earlier, such regulatory mandate should not restrict providers from offering tiered services with varying bandwidth and quality of service levels.

Currently, National Internet Exchange of India (NIXI) does operate Internet Exchange Points across multiple locations within India and while its constitution does permit any entity having its own AS number to connect, currently only the ISP licensees have connected except for a singular non-ISP licensee entity.

In order to utilize the NIXI infrastructure better and to facilitate more efficient exchange of IP traffic, and most importantly for end-user benefit, it would be desirable that all network operators connect with NIXI..

5.1.6 The present licensing conditions require installation of all switches within the licensing area. Do you feel that such restrictions may not facilitate best economical network model and may impact migration to NGN? If yes, what changes in licensing condition do you suggest? Please give your suggestions with justifications. (refer para 4.15.6)

NGN uses a distributed Call Server model, largely geography-independent. Hence, the prevailing licensing condition of mandating location of switches in the respective license area should be done away to facilitate and accelerate NGN migration, to enable the service providers design and adopt the networks in more economical and physically resilient ways to respond to the dynamic market conditions. Economically, service providers may want to place call servers in a few central locations where real estate and operational costs are more favorable, while serving a large span of geographical markets.

Technically, to achieve carrier-grade availability and sometimes load-balancing, it is also common practice for service providers to distribute call processing to servers located outside of the specific service area, or even design the network in a fashion such that each server exist as a pair of units that are deliberately located sufficiently apart from each other in order to achieve geographical redundancy. This comes in very handy especially for the purpose of business continuity planning & disaster response (BCP&DR).

5.1.7 Whether there is a need to define any timeframe in which service providers migrating to NGN networks will be mandated to provide compatible interface for interconnection with TDM networks? If so, what should be the maximum time limit of such mandate to provide compatible interface for interconnection with traditional TDM networks? If no, what should be the method of interconnection to ensure compatibility? Please give your suggestions with justifications. (refer para 4.16.4)

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5.1.8 Do you consider country specific standardization will be necessary to ensure inter operability in NGN environment in view of many optional fields in existing standards? If so, is there a need to prescribe mandatory Interface approval to ensure the interoperability in NGN? If no, then what should be done to ensure interoperability? Please give your suggestions with justifications. (refer para 4.17.3)

Different regions and countries and furthermore, the operators & service providers within there may have their own pace towards NGN migration but it is a globally collective initiative and hence, the NGN interoperability and interconnection requirements transcend national borders. Hence, country-specific standardization is neither necessary nor helpful in improving interoperability in NGN environment.

Firstly, considerable progress has already been made in this direction at international level and for most scenarios, NGN standards have already been approved or under development to facilitate interoperability. The optional fields, if any, in the existing standards are more designed to enable finer granularity of network design and tuning than becoming a barrier for interconnection.

Secondly, specifying country-specific standards may potentially hinder interoperability rather than aid in achieving interoperability in a glbal span of NGN.

Thirdly, country-specific requirements may result in higher cost of NGN product procurement and add undesired burden to NGN migration.

We believe that global market dynamics would create sufficient incentive and necessary pressure for NGN operators to ensure interoperability and interconnection either through peering arrangements (such as NIXI) or via mutually agreed "common point of interconnection" as recommended in the consultation paper.

5.1.9 Whether emergency number dialing be mandated from devices (Fixed, nomadic, and mobile) connected on IP platform in India? If so, is there a need to mandate location details of such devices by service providers? Please support your suggestions with suitable justification. (refer para 4.18.9)

Considerable progress is being made to map the IP address of the subscriber with the relevant geography to facilitate emergency number access in a meaningful manner but a lot is yet to be done. At this point of time, mandating emergency number access would come in the way of innovation in the field of VoIP. However, the service providers must be mandated to communicate to their respective subscribers transparently and upfront about if and what type of emergency number access is being provided and the corresponding limitations thereof.

5.1.10 Whether use of re-authentication for identification verification be mandated across the networks? In your opinion, will this help to reduce vulnerabilities such as identity theft, man in the middle, and IP spoofing? (refer para 4.19.2)

Mandating ID verification in the network layer is likely going to lead the prospect for anti-competitive behavior through standards setting, increased manufacturing costs for both the NGN and devices plugging into the network, and potential balkanization of the networks. As such, we do not recommend the use of re-authentication for identification verification be mandated across the network.

Furthermore, technical as well as legal provisions already exist to mitigate the impact of the type of vulnerabilities mentioned.

5.1.11 Is IPv6 an essential feature of IP transport for the migration to NGN? If so, what should be the timeframe for migration from IPv4 to IPv6? Please support your suggestions with suitable justification. (refer para 4.20.6)

Migration to IPv6 is a long-term trend that may get a boost due to NGN migration but it is definitely not a condition precedent and for a long time to come, we shall see co-existence of IPv4 and IPv6. Rather than placing any specific timeframe for migration from IPv4 to IPv6, it should be left to the stakeholders as their respective decisions would be predicated on technical & economic issues as well as in terms of business plans and the ecosystem readiness.

H. <u>Five tenets of "Network Neutrality"</u>

Network Neutrality is the essence of NGN inasmuch that the network layers are decoupled with the application / service layers.

Hence, we suggest that the Authority lay down the five basic tenets of "Network Neutrality" embodied in the following principles, collectively referred to as the **"Connectivity Principles"**:

i. **Content and services**
Consumers should have access to their choice of legal content and services.

ii. **Applications**
Consumers should be able to run applications of their choice, so long as those applications do not damage the network or are unlawful.

iii. **Personal devices**
Consumers should be permitted to attach any devices they choose to the connection to their homes so long as those devices do not damage the network or are unlawful (e.g., enable theft of a service).

iv. **Service plan information**
Consumers should receive meaningful information regarding their service (subscription) plans / tariff packages.

v. **Choice of connection and services**
Consumers should receive an adequate connection and a robust level of service quality irrespective of whether they purchase or receive other services from an Internet access provider.